

WHAT IS CLAIMED IS:

1. A saponin compound comprising:
  - (a) an aglycone core, wherein said aglycone core is covalently linked to one or more oligosaccharide chains; and
  - (b) a positively charged cationic chain, wherein said chain comprises
    - (i) three or more carbon atoms; and
    - (ii) one or more primary amine groups, one or more secondary amine groups, one or more tertiary amine groups, or one or more guanidine groups, or any combination thereof;and wherein said positively charged cationic chain is covalently bound to said compound.
2. The compound of claim 1, further comprising:
  - (c) a lipophilic chain, wherein said lipophilic chain comprises from 4 to 36 carbon atoms and optionally contains one or more oxyethylene groups.
3. The compound of claim 1, wherein said aglycone core is a triterpenoid aglycone core.
4. The compound of 3, wherein said one or more oligosaccharide chains are covalently linked at C-3, at C-28, or at both C-3 and C-28, of said aglycone core.
5. The compound of claim 1, wherein said compound contains an aldehyde group or a ketone group that is capable of forming an imine or Schiff base with an amino group of a receptor protein on the surface of a cell.
6. The compound of claim 5, wherein said aldehyde or ketone group is attached to said aglycone core.

7. The compound of claim 5, wherein said aldehyde or ketone group is attached to one or more of said oligosaccharide chains.
8. The compound of claim 1, wherein said positively charged cationic chain is selected from the group consisting of a linear aliphatic chain, a branched aliphatic chain, an oligosaccharide, a polysaccharide, a protein, and a polypeptide that is cationic or has been subsequently modified by the introduction of amino groups or similar cationic basic groups that are capable of forming a complex with DNA or RNA.
9. The compound of claim 8, wherein said positively charged cationic chain is a protein.
10. The compound of claim 9, wherein said protein is a histone or protamine.
11. The compound of claim 1, wherein said cationic chain has a molecular weight ranging from 100 daltons to 100,000 daltons.
12. The compound of claim 1, wherein said cationic chain is attached either to a sugar residue of said oligosaccharide chain or to said aglycone core.
13. The compound of claim 2, wherein said lipophilic chain is attached to a sugar residue of said oligosaccharide chain or to said aglycone core.
14. A saponin derivative/polynucleotide complex formed by the association of a compound of claim 1 with a polynucleotide.
15. The complex of claim 14, wherein said polynucleotide is a DNA polynucleotide.
16. The complex of claim 15, wherein said DNA polynucleotide is a noncoding bacterial DNA polynucleotide.
17. The complex of claim 15, wherein said DNA polynucleotide encodes an immunogen.

18. A saponin derivative/polynucleotide secondary complex formed by association of the saponin derivative/polynucleotide complex of claim 14 with one or more saponins selected from the group consisting of a native saponin, a semi-synthetic saponin derivative, and a synthetic saponin containing a triterpenoid aglycone core covalently linked to one or more oligosaccharide chains.
19. A pharmaceutical composition comprising a compound of claim 1 and a pharmaceutically acceptable carrier or diluent.
20. A pharmaceutical composition comprising:
  - (c) a compound of claim 1;
  - (d) a polynucleotide encoding an immunogen, wherein said polynucleotide is operably linked to a promoter; and
  - (e) a pharmaceutically acceptable carrier or diluent.
21. A pharmaceutical composition comprising:
  - (a) a compound of claim 1;
  - (b) a noncoding bacterial DNA polynucleotide; and
  - (c) a pharmaceutically acceptable carrier or diluent.
22. A pharmaceutical composition comprising a saponin derivative/polynucleotide complex of claims 14 or 15 and a pharmaceutically acceptable carrier or diluent.
23. A method of delivering a polynucleotide to cells of an animal in need thereof, comprising administration *in vivo* to the animal of a polynucleotide construct comprising a polynucleotide sequence encoding an immunogen, and a compound of claim 1.
24. The method of claim 23, wherein said polynucleotide construct forms a complex with said compound of claim 1.

25. The method of claim 23, wherein the animal is human.
26. The method of claim 23, wherein said polynucleotide sequence is a DNA sequence that is operably linked to a promoter.
27. The method of claim 23, wherein said polynucleotide sequence is mRNA.
28. The method of claim 23, wherein said construct is a plasmid DNA.
29. The method of claim 23, wherein said administration is intravenous, intramuscular, subcutaneous, transdermal, intranasal, or transmucosal.
30. A method of delivering a polynucleotide to cells of an animal in need thereof, comprising:
  - (a) forming a saponin derivative/nucleic acid complex, wherein said complex is formed by association of a compound of claim 1 and a polynucleotide sequence encoding an immunogen; and
  - (b) administering said complex *in vitro* to the cells of the animal in an amount sufficient that uptake of said polynucleotide sequence into the cells of the animal occurs.
31. A method of stimulating an immune response in an animal in need thereof, comprising
  - administering *in vivo* to the animal a noncoding bacterial DNA polynucleotide and a compound of claim 1.
32. The method of claim 31, wherein said noncoding bacterial DNA polynucleotide forms a complex with said compound of claim 1.
33. The method of claim 31, said method further comprising administering *in vivo* to the animal a polypeptide antigen.

34. The method of claim 31, said method further comprising administering *in vivo* to the animal a polynucleotide sequence encoding an immunogen.

35. A method of stimulating an immune response in an animal in need thereof, comprising

administering *in vivo* to the animal a polynucleotide sequence encoding an immunogen, wherein said polynucleotide sequence is operably linked to a promoter, and a compound of claim 1;

wherein said polynucleotide sequence is administered to the animal in an amount sufficient that uptake of said polynucleotide sequence into cells of the animal occurs, and sufficient expression results, to stimulate the immune response in the animal.

36. The method of claim 35, wherein said polynucleotide sequence forms a complex with said compound of claim 1.

37. A method of stimulating an immune response in an animal in need thereof, comprising:

- (a) introducing into the cells of the animal a polynucleotide sequence encoding an immunogen, wherein said polynucleotide sequence is operably linked to a promoter, and a compound of claim 1; and
- (b) introducing the cells into the animal, wherein sufficient expression of the immunogen occurs in the cells and an immune response is stimulated in the animal.

38. The method of claim 37, wherein said polynucleotide sequence forms a complex with said compound of claim 1.

39. A method of generating a detectable immune response in an animal in need thereof, comprising:

administering *in vivo* to the cells of an animal a polynucleotide sequence encoding an immunogen, wherein said polynucleotide sequence is operably linked to a promoter, and a compound of claim 1;

wherein said polynucleotide sequence is administered in an amount sufficient that uptake of said polynucleotide sequence into the cells of the animal occurs, and sufficient expression results, to generate the detectable immune response.

40. The method of claim 39, wherein said polynucleotide sequence forms a complex with said compound of claim 1.

41. A method of generating a detectable immune response in an animal in need thereof, comprising:

- (a) introducing into the cells of the animal a polynucleotide sequence encoding an immunogen, wherein said polynucleotide sequence is operably linked to a promoter, and a compound of claim 1; and
- (b) introducing the cells into the animal, wherein sufficient expression of the immunogen occurs in the cells and a detectable immune response is generated.

42. The method of claim 41, wherein said polynucleotide sequence forms a complex with said compound of claim 1.